

51. The cartridge of claim 1, wherein the volume of the reaction chambers is in the range of 0.2 μ l to 50 μ l.

52. The cartridge of claim 51, wherein the volume of the reaction chamber is in the range of 1 to 10 μ l.

53. The cartridge of claim 1, wherein the junction between the channels and the reservoir is formed at the periphery of the reservoir and the base of said reservoir is inclined and/or convex, to ensure distribution of a fluid contained in the reservoir to the channels.

54. The cartridge of claim 1, which has a geometry of revolution. In which the reservoir is placed substantially at the centre of said cartridge, the reaction chambers are distributed in a circle around said reservoir and the channels connecting said reservoir to said chambers are essentially radial.

55. The cartridge according to claim 54, in which the base of the reservoir is conical.

56. The cartridge of claim 54, in which the reaction chambers are placed at the periphery of said cartridge.

57. The cartridge of claim 54, with a diameter in the range of 1 to 10 cm.

58. The cartridge of claim 1, which has a translational geometry, in which the reservoir is placed on one side of said cartridge, the reaction cartridges are aligned on the other side of the cartridge, and the channels connecting the reservoir to said chambers are essentially parallel to each other.

59. The cartridge according to claim 58, in which the base of the reservoir is an inclined plane.

60. The cartridge or claim 1, in which the reservoir is divided into 2 to 8 sub-reservoirs, and each of the reaction chambers is connected to just one of said sub-resevoirs via a channel.

61. The cartridge if claim 1, in which the depth of the reaction chambers is in the range of 0.5 to 1.5 mm.

62. The cartridge of claim 1, characterized in that it is produced from a plastics material, preferably polycarbonate.

63. The cartridge of claim 1, the thickness of which is in the range of 0.5 to 5 mm.

64. The cartridge of claim 1, in which the floor of the reaction chambers is in the range of 0.05 to 0.5 thick.

65. The cartridge of claim 64, in which the floor of the reaction chambers is 0.25 mm thick.

66. The cartridge of claim 1, in which the reaction chambers are closed by an upper transparent wall.

09581070-101501

12

67. The cartridge of claim 1, in which the reaction chambers are provided with vents .

68. The cartridge of claim 1, in which the reaction chambers are closed.

69. The cartridge of claim 1, in which the reservoir comprises an opening that can be adapted to means for adjusting the pressure in said reservoir.

70. The cartridge or claim 1, in which each channel is constituted by at least two portions with different diameters , the diameter of the second portion being less than that of the first portion , so as to create a pressure drop in the channel.

71. The cartridge of claim 1, wherein each channel is provided with an anti-reflux cavity at its junction with the reservoir , said anti-reflux cavity being constituted by a substantially vertical channel portion with a diameter that is equal to or greater than that of the channel .

72. The cartridge of claim 1, in which at least a portion of the reaction chambers comprises oligonucleotides.

73. The cartridge of claim 1, in which each reaction chamber comprises two primers specific for a nucleic acid sequence to be amplified and, optionally, a labelled probe specific for said sequence.

74. The cartridge or claim 1, in which at least a portion of the reaction chambers contains reagents that are deposited therein by depositing a liquid followed by drying, such that the arrival of a fluid in said reaction chambers takes said reagents up into solution again.

75. A device for carrying out enzymatic and/or molecular biological reactions requiring at least two different incubation temperatures, characterized in that it comprises:

- at least one cartridge having a plurality of reaction chambers and a reservoir, said reaction chambers being connected to the reservoir via channels ,
- at least one heating plate having at least two distinct zones that can be heated to at least two different temperatures;
- means for relative displacement between said cartridge and said plate, allowing a cyclic variation of the temperature of the reaction chambers.

76. The device of claim 75, in which the enzymatic reaction is a thermoderpendent chain amplification of nucleic acid sequences and in which the zones of the heating plate can be heated to at least two different temperatures, corresponding to phases in the nucleic acid amplification cycles.

77. The device of claim 76, wherein:

- primers specific for the target sequences to be amplified are predistributed in the reaction chambers;
- the reservoir is intended to receive a fluid composed of a sample of nucleic acids to be analysed and the reagents required for a polymerase chain amplification reaction with the exception of primers;

A2

09981070-101501

- the heating plate has three distinct zones that can be heated to three different temperatures corresponding to the three phases of polymerase chain reaction amplification cycles.

78. The device of claim 76, for real-time thermodependent chain amplification of nucleic acid sequences, which comprises optical means for fluorescence excitation/measurement, disposed so as to excite and measure the fluorescence of the contents of the reaction chambers in each cycle.

79. The device of claim 76, in which the cartridge is a cartridge according to claim 1.

80. The device of claim 76, in which the distinct zones for heating the plate are distributed into at least two or three disk portions.

81. The device of claim 76, in which said heating plate is fixed and said cartridge is moved by means of displacement means .

82. The device of claim 76, in which said cartridge is fixed and said heating plate is moved by means of displacement means .

83. The device of claim 76, in which said displacement means cause rotation of said cartridge and/or said heating plate .

84. The device of claim 76, in which the cartridge is in direct contact with the heating plate .

85. The device or claim 76, in which the plate is provided with a coating encouraging relative displacement between said cartridge and said plate .

86. The device of claim 76, in which the heating plate comprises two or three distinct thermoblocks connected to means for programming their temperatures.

87. The device of claim 76, in which the bottom of the cartridge has a central projecting portion comprising a notch , and the displacement means include at least one driver co-operating with said notch to cause said cartridge to move in a rotary motion.

88. The device of claim 76, comprising optical means for fluorescence excitation/measurement disposed above or to the side of the cartridge.

89. The device of claim 76, further comprising means for supplying fluid present in the reservoir to the reaction chambers .

90. The device of claim 89, in which said supply means include a piston device , and the fluid is supplied to the reaction chambers by increasing the pressure.

91. The device of claim 89, in which said supply means include a pump and the fluid is supplied to the reaction chambers by reestablishing the pressure after establishing an underpressure.

92. The device of claim 91, in which the reaction chambers of the cartridge are closed.

A2

09981070-101501

93. A process for amplifying a nucleic acid using a device according to claim 76, comprising the following steps:

- at least partially filling a reservoir with a fluid containing a sample of nucleic acids to be analysed and the components required for carrying out an amplification reaction with the exception of primers;
- distributing said fluid to the reaction chambers of the cartridge, in which are located the primers;
- employing means for relative displacement between the cartridge and the heating plate to successively bring the contents of each reaction chamber to the two, three or more temperatures defined by the two, three or more zones of said heating plate, as many times as is desired.

94. The process of claim 93, wherein said fluid comprising a sample of nucleic acids to be analysed and the components required for carrying out an amplification reaction, with the exception of the primers, further comprises a fluorescent intercalating agent.

95. The process of claim 93, wherein one or more labelled probes are located in the reaction chambers of the cartridge prior to the step of distributing the fluid thereto.

96. The amplification process according to claim 93, in which the step for distributing fluid to the reaction chambers is carried out by applying an underpressure inside the cartridge, then re-establishing the pressure.

97. A process for closed system filling of reaction chambers in a cartridge according to claim 69, comprising the following steps:

- at least partially filling the reservoir with a fluid;
- connecting the cartridge to means for adjusting pressure:

applying an underpressure inside the cartridge, then re-establishing the pressure.

A2
Concl

09981070.10194
FBI/DOJ